

REMARKS

The Office Action dated July 21, 2004, has been received and reviewed.

Claims 1-14 and 16-24 have been considered in the above-referenced application. Of these, claims 1-4, 6, 8, 13, 17-19, 21, 23, and 24 stand rejected, while claims 5, 14, 20, and 22 have been objected to, and claims 7 and 9-12 have been allowed.

Reconsideration of the above-referenced application is respectfully requested.

Claim Amendments

Independent claims 1 and 18 have been amended to indicate that there is no discernable boundary between a ledge of at least one shallow trench isolation structure and the remainder of the shallow trench isolation structure. As both of these claims already recited that the ledge was “integral,” these revisions do not narrow or otherwise change the scope of either independent claim 1 or independent claim 18.

Double Patenting Rejection Under 35 U.S.C. § 101

Claim 8 stands rejected under 35 U.S.C. § 101 for claiming the same invention as that recited in claims 5-12 of U.S. Patent 6,322,634. Specifically, it appears that the Office has asserted that claims 7 and 8 recite substantially the same subject matter as that recited in claim 5 of U.S. Patent 6,322,634.

While it is acknowledged that claim 8 includes many of the same limitations as those recited in independent claim 5 of U.S. Patent 6,322,634, claim 8 depends from claim 7, which differs in scope from claim 5 of U.S. Patent 6,322,634.

Since claim 8 depends from a claim which is allowable under 35 U.S.C. § 101, claim 8 is also allowable. Accordingly, withdrawal of the 35 U.S.C. § 101 rejection of claim 8 is respectfully requested.

Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 16 and 17 have been rejected under 35 U.S.C. § 112, second paragraph, for reciting subject matter which is purportedly indefinite.

Claims 16 and 17 have both been canceled without prejudice or disclaimer, rendering the 35 U.S.C. § 112, second paragraph, rejections of these claims moot.

Rejections Under 35 U.S.C. § 102

Claims 1-4, 6, 13, 17-19, 21, 23, and 24 are rejected under 35 U.S.C. § 102.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Mandelman

Claims 1-4, 6, 13, 17-19, 21, 23, and 24 stand rejected under 35 U.S.C. § 102(b) for reciting subject matter which is purportedly anticipated by the subject matter disclosed in U.S. Patent 5,521,422 to Mandelman et al. (hereinafter “Mandelman”).

Mandelman describes (at col. 5, lines 3-23) and illustrates (in FIG. 4c) a precursor to a semiconductor device structure that includes a semiconductor substrate 10 with trenches formed therein. The trenches of the semiconductor substrate 10 are lined with a thermal oxide 34, as are areas of the active surface of the semiconductor device 10 that are located adjacent to the trenches. Shallow trench isolation (STI) structures 18a fill the remaining space within the trenches, and extend over the areas of the active surface of the semiconductor substrate that are located adjacent to the trenches. The STI structures of Mandelman include separately formed ledges, which Mandelman refers to as “spacers 22.” Col. 3, line 66, to col. 4, line 17. Mandelman lacks any express or inherent description that the STI structures 18a and the spacers 22 may somehow be annealed to or otherwise rendered indiscernible from each other.

The precursor to which independent claim 1 is drawn includes a shallow trench isolation structure with an integral ledge. Thus, as independent claim 1 has been amended to recite, there is no discernable boundary between the ledge and the remainder of the shallow trench isolation structure.

Mandelman does not expressly describe that the STI structures 18a thereof may contact an active surface of a semiconductor substrate. Mandelman also lacks any description that the STI structures 18a thereof are rendered indiscernible from the underlying thermal oxide 34. Thus, Mandelman does not inherently describe that the STI structures 18a thereof contact an active surface of a semiconductor substrate.

Therefore, Mandelman does not anticipate each and every element of amended independent claim 1, as is required to maintain a rejection under 35 U.S.C. § 102(b). Therefore, under 35 U.S.C. § 102(b), amended independent claim 1 recites subject matter which is allowable over that described in Mandelman.

Each of claims 2-4 and 6 is allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Independent claim 13 is drawn to an intermediate semiconductor device structure that includes a semiconductor substrate with at least one trench formed therein, and a trench isolation structure within the at least one trench. The trench isolation structure also extends laterally over and contacts a portion of the active surface of the semiconductor substrate adjacent to a trench corner.

Mandelman does not expressly or inherently describe an intermediate semiconductor device structure that includes a trench isolation structure that extends laterally over and contacts a portion of the active surface of a semiconductor substrate adjacent to a trench corner. Rather, the description of Mandelman is limited to spacers 22 that are located adjacent to lateral edges of STI structures to cover portions of the active surface of a semiconductor substrate that are located adjacent to trench corners.

As Mandelman does not anticipate each and every element of independent claim 13, it is respectfully submitted that independent claim 13 is drawn to subject matter that, under 35 U.S.C. § 102(b), is allowable over the subject matter disclosed in Mandelman.

Claim 17 has been canceled without prejudice or disclaimer, rendering moot the rejection thereof.

Independent claim 18, as amended and presented herein, recites a precursor to a semiconductor device structure. The precursor includes, among other things, at least one shallow trench isolation structure that includes at least one integral ledge that lacks a discernable boundary with the remainder of the shallow trench isolation structure.

Mandelman does not expressly or inherently describe that the STI structures 18 and spacers 22 disclosed therein are integral with one another, or that there is no discernable boundary between the STI structures 18 and the spacers 22.

Therefore, it is respectfully submitted that the subject matter recited in amended independent claim 18 is, under 35 U.S.C. § 102, allowable over the subject matter described in Mandelman.

Each of claims 19, 21, 23, and 24 is allowable, among other reasons, for depending directly or indirectly from claim 18, which is allowable.

Morita

Claims 1-4, 6, 13, 17 through 19, 21, 23 and 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,506,168 to Morita et al. (hereinafter “Morita”).

FIG. 72 of Morita shows an intermediate semiconductor device structure that includes a semiconductor substrate 1 with at least one trench 2 formed therein, silicon oxide films 11 and 36 lining the active surface of the semiconductor substrate 1 and the surfaces of the trench 2, respectively, and a silicon nitrogen film 37 filling the at least one trench. *See also*, col. 13, lines 19-26. As FIG. 72 clearly depicts, the surface of the silicon nitrogen film 37 tapers at the edges thereof.

Independent claims 1 and 13 both recite structures that include at least one shallow trench isolation structure with a substantially flat surface. As the surface of the silicon nitrogen film 37 of Morita has tapered edges, it is not substantially flat.

Claims 2-4 and 6 are each allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Claim 17 has been canceled without prejudice or disclaimer, rendering the rejection thereof moot.

Independent claim 18, as amended and presented herein, recites a precursor to a semiconductor device structure that includes a semiconductor substrate, at least one trench formed in the semiconductor substrate, and a buffer film layer over an active surface of the semiconductor substrate. In addition, the precursor structure of amended independent claim 18 includes at least one shallow trench isolation structure at least partially within the at least one trench. The at least one shallow trench isolation structure is exposed through the buffer film layer. In addition, the at least one shallow trench isolation structure includes at least one integral ledge that extends laterally outward from the at least one trench so as to contact an area of the active surface adjacent the at least one trench.

Morita includes no express or inherent description of a structure that includes a shallow trench isolation structure that includes a ledge that contacts an active surface of a semiconductor substrate and that is exposed through a buffer film layer located over the active surface.

As Morita does not describe these elements in identical detail to that provided by independent claim 18, it is respectfully submitted that, under 35 U.S.C. § 102(b), the subject matter recited in independent claim 18 is allowable over that described in Morita.

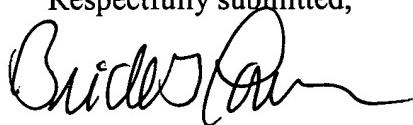
Claims 19, 21, 23, and 24 are each allowable, among other reasons, for depending either directly or indirectly from claim 19, which is allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(b) rejections of claims 1-4, 6, 13, 17-19, 21, 23, and 24 be withdrawn.

CONCLUSION

It is respectfully submitted that each of claims 1-14 and 18-24 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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